

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of MARKAIR for an exemption from §§ 25.855(c) and (e) of the Federal Aviation Regulations	Regulatory Docket No. 022NM
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GRANT OF EXEMPTION

By letter dated December 7, 1990, Mr. K. Gene Zerkel, Vice President, Flight Operations/Maintenance, MarkAir, P.O. Box 196769, Anchorage, Alaska 99519-6769, petitioned for an exemption from § 25.857(b)(1) of the Federal Aviation Regulations (FAR) to permit type certification and operation of two U.S. registered de Havilland DHC-8-311 airplanes, Serial Numbers 230 and 242, that have rapid reconfiguration capability into the following combinations of passengers and cargo volume:

- (a) 48 passengers/390 cu. ft. cargo
(b) 40 passengers/600 cu. ft. cargo
(c) 20 passengers/1142 cu. ft. cargo
(d) 0 passengers/1672 cu. ft. cargo

The petitioner requests that the exemption apply to the 40, 20, and 0 passenger configurations. The exemption would permit operation of these two airplanes in these configurations with cargo loaded in a manner that does not provide the required access for firefighting.

Section of the FAR affected:

Section 25.857(b)(1) defines a Class B cargo or baggage compartment in part, as one in which there is sufficient access in flight to enable a crewmember to effectively reach any part of the compartment with the contents of a hand fire extinguisher.

Related Sections of the FAR:

Section 25.855(c) specifies that there must be means to prevent cargo or baggage from interfering with the functioning of the fire-protective features of the compartment. Section 25.855(e) specifies that cargo or baggage compartments must meet one of the class requirements of § 25.857. In addition, this section specifies that flight tests must be conducted to show compliance with § 25.857 concerning compartment accessibility.

The petitioner's supportive information from the letter of petition dated December 7, 1990, and a supplemental letter to the FAA dated December 26, 1990, is as follows:

1. In the 40, 20, and 0 passenger configurations, all cargo will be palletized and each pallet will be covered by a Fire Containment Cover (FCC) that meets the flammability requirements for Class B and Class C cargo compartment liners and also satisfies the intent of a Class D cargo compartment.
2. All freight received by MarkAir will be processed in accordance with MarkAir's Approved Hazardous Materials Training Programs. Hazardous Materials Training will be provided annually as prescribed in the MarkAir Hazardous Materials Program Manual. Additional FCC installation training will be provided annually and included in the MarkAir Cargo Manual. This training will include care and inspection of FCCs as well as actual installation. Each Certified Cargo Loader will be given on-the-job training and supervision in the actual building of pallets and FCC installation and removal.
3. The Cargo Lead on duty will be responsible for the inspection of FCCs at the base station as well as outstations. Each FCC will be inspected for rips, tears, and/or abrasions by the Cargo Lead after being removed from the pallet. Each FCC will then be hung up in the aft cargo/baggage area. Each FCC will again be inspected when placed atop the next cargo pallet.
4. Cargo is to be loaded on and built up on 38" x 51" aluminum pallets. Each pallet will be covered by an FCC. A cable attached to the bottom of each FCC is attached to the pallet with a series of clips. The loaded pallet is guided onto the roller tray assembly and rolled forward to the appropriate location. Once in place, the palletized cargo is locked with spring-loaded pallet lock assemblies built into the tray assemblies. The lock assemblies ensure that the pallets are restrained from moving along the track. The cable at the bottom of the FCC is then cinched down to assure an airtight fit to the bottom of the pallet. A net is installed over each FCC and secured to the floor locks with a series of "widgets."
5. Smoke detectors in the cargo compartments have been demonstrated to alert the flightcrews of the presence of smoke within one minute.
6. The Airplane Flight Manual (AFM) requires the flightcrew to land at the nearest suitable airport in the event of cargo compartment smoke detection.
7. Fire fighting equipment will be installed in the airplane for all configurations, and the flight attendants will be trained in the use of this equipment and the fighting of cargo fires. Even

though cargo compartment access is not always guaranteed if the exemption is granted, a large percentage of the time there would be sufficient access to effectively fight a cargo compartment fire.

8. The MarkAir route structure is constructed to serve the needs of the rural Alaska population which is scattered over five hundred and eighty-six thousand square miles from the North Slope Arctic Regions, Western and South Central Alaska, and the Aleutian Island chain. These areas have communities with populations varying from a few thousand to less than one hundred.

This market area can only be served by a cost-efficient aircraft that has the capability to operate from both paved and gravel runways and also has the capability to serve both cargo and passengers on all flight segments. The basic reason for the cargo/passenger ("combi") is due to the great variations in cargo/passenger mix on a daily basis between the different seasons of the year, along with the sparse permanent population and the vast distances within the State.

Spring, summer, fall, and winter present radically different passenger counts. Passenger volumes tend to increase over 100 percent in the three short summer months. It is easy to recognize that for the state of Alaska, with no road system, air travel is a necessary part of life and not a luxury or alternate means of transportation. One can also readily determine that a high degree of flexibility is essential to accommodate the radical swings in volume of both cargo and passengers.

Alaska's bush population is comprised primarily of minority people, namely Indian, Eskimo, as well as Alaskan Natives. These minority people depend on the flexibility of a "combi" aircraft, especially in the 20 passenger/1143 cu. ft. configuration, as a primary means of transportation for travel, emergency travel, mail and freight. In Alaska, the bush depends on building materials and household goods, as well as essential commodities such as basic food stuffs (milk, etc.) and medication/drugs all travelling under the guise of mail. These items are the very sustenance of life for people in the Alaskan bush. The flexibility of a "combi" aircraft, especially in the 20 passenger/1143 cu. ft. configuration, is the only viable means of transportation when personal and emergency travel are coupled with mail and freight.

The only logical aircraft on the market that would operate in the Alaskan harsh environment safely, reliably, and economically is a combination cargo/passenger aircraft. No other aircraft available would meet the requirements. Any service that denies the flexibility of a "combi" aircraft, especially in the 20 passenger/1143 cu. ft. configuration, will positively mean undue economic hardship for all rural Alaska, lowering a life style which is already sub-standard by any United States measurement.

The availability of DHC-8 S/N 230 and 242 is already delayed from the original schedule for introduction into service. This is placing an increasing burden on existing equipment usage at MarkAir. MarkAir's fleet cannot provide the anticipated demand for cargo and passenger lift from now until June 30, 1991, without these two aircraft.

9. The Dash 8 aircraft were purchased specifically for operation on "thin" routes to such communities as Aniak, St. Mary's, Unalakleet, Galena, and McGrath. In the past, MarkAir provided service on a 6 day per week basis with large aircraft. Recently, they were forced to reduce service to 4 or 5 days per week due to increased fuel costs. If use of fuel efficient transport category aircraft is further restricted by the need for access into the cargo compartment for fire fighting, MarkAir may be forced to reduce service to 3 or 4 times per week. Such a reduction is clearly not in the best interests of these small communities.
10. Providing access to the Class B cargo compartment per § 25.857(b)(1) requires that the cargo load be reduced to about half of available capacity since the pallet loads must be staggered for the length of the cargo compartment to assure proper lateral weight distribution as well as access. MarkAir shows that the average revenue from a pound of cargo transported to the various Alaskan communities is about \$0.32. Additionally, they show that the cargo compartment fire fighting access requirement reduces the cargo load by 3,897 lbs., 2,227 lbs., and 557 lbs. respectively for the 0 passenger, 20 passenger and 40 passenger "combi" configurations. Thus, cargo revenue lost per trip if access is required is \$1,247, \$713, and \$178 respectively for the 0, 20, and 40 passenger configurations.
11. Although not shown in their petition and follow-on supportive material, MarkAir shows, in their response to NPRM 89-NM-205-AD, dated November 3, 1990, that a requirement to have fire fighter access to the cargo compartment also has an economic impact upon the communities served. One impact already mentioned is that frequency of service must be curtailed since passenger revenues alone won't support daily service. Another impact is that passenger ticket prices would need to be raised to offset the loss of less than a full load of cargo. To cite a couple of examples: From Anchorage to Pt. Barrow in a "combi," the per passenger price would be \$207. From Anchorage to Pt. Barrow on an all passenger flight, the per passenger price would be \$317. From Anchorage to St. Mary's in a "combi," the per passenger price would be \$149. From Anchorage to St. Mary's on an all passenger flight, the per passenger price would be \$333. Serving the MarkAir routes with non-combi service would raise the percentage of disposable income required for air transportation and reduce the purchases of other goods and services in these communities.
12. Cutting the cargo load to one-half that available due to a firefighter access requirement makes it economically unfeasible to operate in a mixed passenger/cargo configuration. Therefore, without an exemption to the § 25.857(b)(1) Class B cargo compartment access requirement, the DHC-8-311 with mixed passenger/cargo configurations has no economic value, and an essential service to many Alaskan communities cannot be provided.

A summary of this petition was published in the Federal Register on January 9, 1991 (56 FR 908), affording interested persons the opportunity to participate in the rulemaking. Two commenters responded.

One commenter, an organization representing airline pilots, states that placing a fixed-sized, flame-penetration resistant blanket over a pallet does not meet the Class D cargo compartment criteria of § 25.857(d) because the irregular surface generated by the tops of the cargo boxes or passenger bags prevents an adequate seal. (As defined in § 25.857(d), a

Class D cargo or baggage compartment is one into which the flow of air is carefully minimized. Should a fire occur in a Class D compartment, it will be safely contained due to a lack of oxygen until it can be extinguished on the ground. Provisions for fire or smoke detection and extinguishment are, therefore, not required for Class D compartments.)

The commenter expresses concern that an FCC would deteriorate with usage, and after being exposed to numerous conditions lose whatever sealing capacity it had, thus providing an air supply to feed a fire.

The commenter further notes that there is, according to the commenter, a significant potential danger due to cargo containing undeclared or hidden hazardous materials and goods.

Finally, the commenter states that granting this exemption would not provide a level of safety equivalent to that provided by compliance with § 25.857(b)(1) and that it would set an unsatisfactory precedent counter-productive to existing and in-progress rulemaking on Class B compartments.

The second commenter, the manufacturer of the two airplanes involved, notes in contrast that with the use of FCCs encapsulating each loaded pallet, the following safety features exist:

1. A fire occurring in any pallet will be completely confined to that pallet without endangering the safety of the aircraft or its occupants.
2. The FCC will minimize the production of smoke and contain flames. Testing of FCCs has been conducted to FAR 25, Appendix F, Part III (Amendment 25-70); they have contained a fire for over 3 hours.
3. Cabin ventilation and drafts will not affect the environment within the close-fitting FCCs.
4. In consideration of the heat generated within the covered pallets, there are no critical parts of the aircraft adjacent to the cargo.

The second commenter also points out that MarkAir's route structure has been carefully planned such that each flight sector ensures that alternate landing sites are available should the need arise.

The commenter also points out that these very conservative measures, coupled with a commuter service history that shows no baggage compartments have been, nor are likely to be, a safety hazard, gives good cause to allow operation of these two aircraft in cargo/passenger configurations without the need for a dedicated access aisle.

Finally, the second commenter recommends that the FAA grant MarkAir the approval to operate DHC-8-311, serial numbers 230 and 242, without the need to comply with § 25.857(b)(1).

The FAA's analysis/summary is as follows:

The petitioner is requesting an exemption from § 25.857(b)(1) which states: "A Class B cargo or baggage compartment is one in which- (1) There is sufficient access in flight to enable a crewmember to effectively reach any part of the compartment with the contents of a hand fire extinguisher;". The FAA notes that § 25.857(b)(1) merely defines a Class B cargo compartment. It is actually §§ 25.855(c) and (e) that implement the requirement from which the petitioner seeks relief.

The petitioner serves a market that is unique and has need for economical air transport of both passengers and essential commodities. Additionally, it has clearly been shown that their market requires flexibility to readily reconfigure an airplane passenger/cargo mix to accommodate destination variation requirements, as well as seasonal variation requirements.

It is clear that the de Havilland DHC-8-311 "combi" can provide the flexibility required to readily reconfigure the airplane to suit the variable passenger/cargo mix encountered by MarkAir. It has also been shown that the DHC-8-311 "combi" can economically provide the variations in passenger/cargo service required by the various remote Alaskan communities, provided that a full load of cargo can be carried.

Compliance with the requirements of §§ 25.855(c) and (e) pertaining to access for firefighting would enable the petitioner to carry only one half the possible cargo load in the DHC-8-311 "combi." The petitioner has stressed that the access requirement makes the DHC-8-311 "combi" economically unsuitable for combined passenger-cargo use. Therefore, if the petitioner's request is denied, many remote Alaskan communities will receive less frequent passenger and cargo service or must pay a substantially higher price for service.

The petitioner and the airplane manufacturer both support the use of FCCs over each pallet load of cargo as a means to provide an adequate level of safety offsetting the requirement to provide cargo compartment fire fighter access. The airplane manufacturer points out several specific safety features provided by the use of FCCs. The principal ones are that an FCC contains fire and smoke, and ventilating air and drafts are kept from a cargo fire. The FAA concurs that the use of FCCs are beneficial in retarding the spread of heat and flames in the event of a fire under an FCC.

Another commenter points out several deficiencies in the use of FCCs. One is that they will deteriorate with time and usage. The commenter is correct. However, if the exemption is granted, the FAA will require MarkAir to establish policy and procedures that require a thorough inspection of each FCC after removal from a pallet of cargo and again prior to installation. Repairs will be required for all damage. As FCCs deteriorate, the cost of frequent repairs will force their replacement.

The commenter also notes that placing a blanket or FCC over a pallet would not meet the standards for a Class D cargo compartment. The commenter may be correct in that regard. The FAA is not aware of any attempts to certify an FCC covered pallet to Class D cargo compartment standards. However, it is not intended that placing an FCC over a pallet would meet all the Class D requirements.

The commenter also states that an irregularly shaped cargo load would adversely impact the FCC seal. The FAA has reviewed the FCC design and installation procedures and finds the following. The FCCs are "full-cut" to reach the floor when placed over a pallet loaded to maximum volume, regardless of shape. At the bottom of the FCC, a cable is attached around the periphery of the opening. The cable is attached to the aluminum pallet with a series of spring-loaded locking tabs. The locking tabs are then inserted into the seat track and secured. Finally, the cable is cinched up to secure the FCC opening tight against the pallet. The FAA concludes that the seal between the pallet and FCC is not affected by cargo shape.

The FCCs proposed to be used by the petitioner have been tested and shown to meet the Part 25, Appendix F, Part III cargo compartment liner flame penetration resistance provisions. It has been demonstrated that they can contain a fire for over three hours. The route structure that MarkAir intends for the DHC-8-311 "combi" is such that it will not be more than 45 minutes away from a suitable airport.

The DHC-8-311 "combi" was certificated with a Class B cargo compartment. One of the demonstrated capabilities is smoke detection within one minute. Even though the FCC retards propagation of smoke as well as heat, the silicon-rubber coating of the FCC itself temporarily gives off dense smoke if there is elevated temperature under the cover. It has been demonstrated by flight testing that the smoke can readily be cleared through the aft outflow valves and does not penetrate the passenger or crew compartments. However, this smoke would activate the fire warning system and facilitate an early landing. In this regard, the AFM contains instructions to land at the nearest suitable airport in the event that a fire warning is annunciated.

It is concluded that an airplane with a cargo compartment meeting the provisions of § 25.857(b)(1), except for fire fighter access, has an adequate level of safety if FCCs are used in accordance with the policy and procedures proposed by the petitioner. The following features of the petitioner's proposal would compensate for the lack of access to the compartment: (1) special procedures to be used for cargo pallet loading, FCC installation, FCC inspection and FCC maintenance; (2) a requirement to always be within 45 minutes of a suitable airport; and (3) a requirement to land at the nearest suitable airport if a fire warning is annunciated.

Additionally, it is concluded that it is beneficial to the public for the petitioner to be able to operate the DHC-8-311 "combi" in a manner whereby it can feasibly serve remote Alaskan communities.

In consideration of the foregoing, I find that a grant of exemption is in the public interest and will not significantly affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in §§ 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), MarkAir is granted an exemption from §§ 25.855(c) and (e) of the FAR to the extent necessary to permit type certification and operation of the specified de Havilland DHC-8-311 airplanes in the following passenger/cargo compartment volume configurations without providing fire fighting access into the cargo compartments:

- (a) 40 passengers/600 cu. ft. cargo
- (b) 20 passengers/1142 cu. ft. cargo
- (c) 0 passengers/1672 cu. ft. cargo

This exemption is subject to the following conditions:

1. It is valid only for de Havilland Model DHC-8-311 airplanes, Serial Numbers 230 and 242, while operated by or on behalf of the petitioner in the state of Alaska.
2. Each FCC shall be inspected in accordance with and subject to the usage/repair provisions of MarkAir Cargo Procedures Manual, Chapter 9, page 86, Revision 9, dated January 10, 1991.
3. All flammable cargo carried on these airplanes shall be covered by FCCs in accordance with the MarkAir Cargo Procedures Manual, Chapter 9, pages 87 and 88, Revision 9, dated January 10, 1991.

4. A copy of this exemption must be carried onboard the affected airplanes with their airworthiness certificates.
5. The airplane shall operate in such a manner that it is not more than 45 minutes away from a suitable airport.

Issued in Renton, Washington, on February 8, 1991.

/s/ Darrell M. Pederson
Acting Manager
Transport Airplane Directorate
Aircraft Certification Service
